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ADA COMPILER VALIDATION SUMMARY REPORT: TELELOGIC

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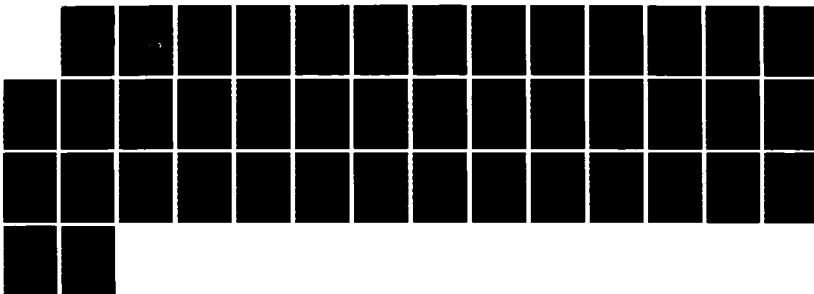
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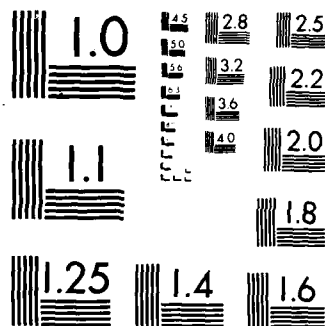
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IABG m.b.h., Dept. SZT  
Einsteinstrasse 20  
D 8012 Ottobrunn

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 TeleLOGIC  
 TeleSoft Ada, Version 3.7  
 Sun 2-120



Completion of On-Site Validation:  
 86-04-21

Prepared By:  
 IABG m.b.H., Dept SZT  
 Einsteinstrasse 20  
 D 8012 Ottobrunn

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 DEPARTMENT OF DEFENSE

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# Ada\* Compiler Validation Summary Report:

Compiler Name: TeleSoft\_Ada, Version 3.7

## Host Computer

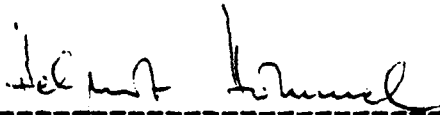
Sun 2-120  
under  
Sun 2.0

## Target Computer

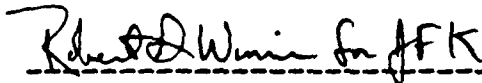
Sun 2-120  
under  
Sun 2.0

Testing Completed Using ACVC 1.7

This report has been reviewed and approved:



IABG m.b.H., Dept SZT  
Dr. Helmut Hummel  
IABG, Dept SZT  
Einsteinstrasse  
D-8012 Ottobrunn



Ada Validation Office (AVO)  
Dr. John F. Kramer  
Institute for Defense Analyses  
Alexandria, VA



Ada Joint Program Office (AJPO)  
Virginia L. Castor  
Director  
Washington, D.C.

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## EXECUTIVE SUMMARY

The Validation Summary Report presents the results and conclusions of testing performed on the TeleSoft Ada, Version 3.7. Standardized tests serve as input to an Ada compiler, producing results which are evaluated by the validation team. This summary briefly states the highlights of the TeleSoft\_Ada, Version 3.7, validation.

On-site testing was performed 86-04-11 through 86-04-21 at Nynäshamn under the auspices of the IABG m.b.H., Dept SZT (AVF), according to Ada Validation Office policies and procedures. The TeleSoft\_Ada, Version 3.7, is hosted on Sun 2-120 operating under Sun 2.0. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.7, was used. The ACVC is used to validate conformance of a compiler to ANSI/MIL-STD-1815A Ada. The purpose of testing is to ensure that a compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation dependent but permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, or during execution.

The results of validation are summarized in the following table.

RESULT	TEST CLASS						TOTAL
	A	B	C	D	E	L	
Passed	66	821	1023	17	9	21	1957
Failed	0	0	0	0	0	0	0
Inapplicable	2	3	297	0	2	2	306
Anomalous	0	0	0	0	0	0	0
Withdrawn	0	4	12	0	0	0	16
TOTAL	68	828	1332	17	11	23	2279

Tests found to contain errors were withdrawn from Version 1.7 of the Ada Compiler Validation Capability (ACVC). When validation was completed, the tests listed in Chapter 2.2 had been withdrawn.

One additional test had been withdrawn when prevalidation was completed. This is taken into account in the final tables.

Some tests demonstrate that language features are not supported by an implementation. For this implementation the tests determined the following.

- . SHORT\_INTEGER is not supported:  
B52004E-AB.DEP B55B09D-AB.DEP B86001CR-AB.DEP  
C34001D-B.DEP C55B07B-AB.DEP
- . LONG\_INTEGER is supported:  
B52004D-AB.DEP B55B09C-AB.DEP B86001CS-AB.DEP  
C34001E-B.DEP C55B07A-AB.DEP
- . SHORT\_FLOAT is not supported:  
B86001CP-AB.DEP C34001F-B.DEP C35702A-AB.DEP
- . LONG\_FLOAT is not supported:  
B86001CQ-AB.DEP C34001G-B.DEP C35702B-AB.DEP
- . Representation specifications for noncontiguous enumeration representations are not allowed:  
C55B16A-AB.DEP  
B86001DT-AB.TST
- . The only predefined numeric types are INTEGER, FLOAT, LONG\_INTEGER:
- . The package SYSTEM is used by package TEXT\_IO:  
C86001F-B.DEP
- . The 'SIZE clause is not supported:  
C87B62A-B.DEP
- . The 'STORAGE\_SIZE clause is not supported:  
C87B62B-B.DEP
- . The 'SMALL clause is not supported:  
C87B62C-B.DEP
- . Generic subroutine declarations and bodies cannot be compiled in separate compilation units:  
CA1012A-B.DEP
- . Generic package bodies cannot be compiled in separate compilation files:  
CA2009C-B.DEP

- . Generic subprogram bodies cannot be compiled in separate compilation files:

CA2009F-B.DEP

- . Pragma INLINE is not supported for procedures:

LA3004A-AB.ADA    CA3004E-B.ADA  
E13004C-B.ADA

- . Pragma INLINE is not supported for functions:

LA3004B-AB.ADA    CA3004F-B.ADA  
EA3004D-B.ADA

- . Mode IN\_FILE is supported (for sequential I/O):

CE2102D-B.ADA

- . Mode OUT\_FILE is supported (for sequential I/O):

CE2102E-B.ADA

- . Mode INOUT\_FILE is supported (for direct I/O):

CE2102F-B.ADA

- . Mode RESET and DELETE are supported (for sequential and direct I/O):

CE2102G-B.ADA

- . Mode IN\_FILE is supported (for direct I/O):

CE2102I-B.ADA

- . Mode OUT\_FILE is supported (for direct I/O):

CE2102J-B.ADA

- . Dynamic creation and deletion of files are allowed:

CE2106A-B.DEP    CE3110A-B.ADA

- . More than one internal file can be associated with the same external file:

CE2107B-B.ADA    CE2107C-B.ADA  
CE2107D-B.ADA    CE2111D-B.ADA  
CE3111B-B.ADA    CE3111C-B.ADA  
CE3114B-B.ADA

- . Instantiation of package SEQUENTIAL\_IO with



unconstrained array types is not allowed:

CE2201D-B.DEP

- . Instantiation of package SEQUENTIAL\_IO with unconstrained record types with discriminants is not allowed:

CE2201E-B.DEP

- . Dynamic creation and resetting of files is supported:

CE2210A-B.ADA

- . Instantiation of package DIRECT\_IO with unconstrained array types and unconstrained types with discriminants is not supported:

CE2401D-B.DEP

- . An external file associated with more than one internal file can be reset:

CE3115A-B.DEP

- . Illegal filenames can exist:

CE2102C-B.DEP

ACVC Version 1.7 was taken on-site via magnetic tape to Nynäshamn. The tape was loaded, and all tests, except for the executable tests which make use of a floating point precision greater than SYSTEM.MAX\_DIGITS, were compiled on Sun 2-120. Class A, C, D, and E tests were executed on Sun 2-120.

On completion of testing, all results were analyzed for failed Class A, C, D, or E programs, and all Class B and L compilation results were individually analyzed.

The ACVC, Version 1.7, contains 2279 tests of which 1957 were applicable to TeleSoft Ada, Version 3.7. No anomalies were found in the testing of this compiler. Testing demonstrated that all applicable tests were passed by this compiler and conformed to the Ada Standard. The AVF concluded that the results show acceptable compliance to ANSI/MIL-STD-1815A Ada.

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## CHAPTER 1

### INTRODUCTION

The Validation Summary Report describes how an Ada compiler conforms to the language standard. This report explains all technical terms used within and thoroughly reports the Ada Compiler Validation Capability (ACVC) test results. Ada compilers must be written according to the language specification as given in the ANSI/MIL-STD-1815A Ada. All implementation-defined features must be included for the compiler to conform to the Standard. Following the guidelines of the Standard ensures continuity between compilers. That is, the entire Standard must be implemented, and nothing can be implemented that is not in the Standard.

Even though all validated Ada compilers conform to the Standard, it must be understood that some differences do exist between implementations. ANSI/MIL-STD-1815A permits some implementation dependencies, e.g., the maximum length of identifiers, the maximum values of integer types, etc. These implementation-dependent features limit the portability of programs between compilers. Other differences between compilers are due to limitations imposed on a compiler by the operating system and by the hardware. All of these dependencies are given in the report.

Validation summary reports are written according to a standardized format. Compiler users can, therefore, more easily compare the reports from several compilers when selecting a compiler for a given task. The validation report can be completed mostly from the test results produced during validation testing. Additional testing information is given at the end of the report and states problems and details which are unique for a specific compiler. The format of the validation report limits variance between reports, enhances readability of the report, and accelerates report readiness.

#### 1 INTRODUCTION

##### 1.1 Purpose of this Validation Summary Report

The Validation Summary Report documents the results of the testing performed on an Ada compiler. Testing was carried out for the following purposes:

- To identify any language constructs supported by the translator that do not conform to the Ada Standard

- . To identify any unsupported language constructs required by the Ada Standard
- . To describe the implementation-dependent behavior allowed by the Ada Standard

Testing of this compiler was conducted by IABG m.b.H., Dept SZT according to policies and procedures established by the Ada Validation Office (AVO). Testing was conducted from 86-04-11 through 86-04-21 at Nynäshamn.

## 1.2 Use of this Validation Summary Report

Consistent with the national laws of the originating country, the Ada Validation Office may make full and free public disclosure of this report. In the United States, this is provided in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of this validation apply only to the computers, operating systems, and compiler versions identified in this report.

The organizations represented on the signature page of this report do not represent or warrant that any statement or statements set forth in this report are accurate or complete, or that the subject compiler has no nonconformances to the Ada Standard other than those presented. This report is not intended for the purpose of publicizing the findings summarized herein.

Questions regarding this report or the validation tests should be directed to:

Ada Validation Office  
Institute for Defense Analyses  
1801 N. Beauregard  
Alexandria VA 22311  
U.S.A.

and to:

IABG m.b.H., Dept SZT  
Einsteinstrasse 20  
D-8012 Ottobrunn  
Federal Republic of Germany

## 1.3 REFERENCES

1. Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A,
2. Ada Validation Organization: Policies and Procedures, MITRE Corporation, Jun 1982

3. Ada Compiler Validation Implementer's Guide, SofTech, Inc., Dec 1984.

1.4 DEFINITION OF TERMS

Anomaly	A test result that, given pre-validation analysis, is not expected during formal validation but is judged allowable under the circumstances.
ACVC	The Ada Compiler Validation Capability. A set of programs that evaluates the conformance of a compiler to the Ada language specification, ANSI/MIL-STD-1815A.
Ada Standard	ANSI/MIL-STD-1815A, February 1983.
Applicant	The agency requesting validation.
AVF	The IABG m.b.H., Dept SZT. In the context of this report, the AVF is responsible for conducting compiler validations according to established policies and procedures.
AVO	The Ada Validation Office. In the context of this report, the AVO is responsible for setting policies and procedures for compiler validations.
Compiler	A processor for the Ada language. In the context of this report, a compiler is any language processor, including cross-compilers, translators, and interpreters.
Failed test	A test for which the compiler generates a result that demonstrates nonconformance to the Ada Standard.
Host	The computer on which the compiler resides.
Inapplicable test	A test that uses features of the language that a compiler is not required to support or may legitimately support in a way other than the one expected by the test.
Passed test	A test for which a compiler generates the expected result.
Target	The computer for which a compiler generates code.

Test                   A program that evaluates the conformance of a compiler to a language specification. In the context of this report, the term is used to designate a single ACVC test. The text of a program may be the text of one or more compilations.

Withdrawn test        A test that has an invalid test objective, fails to meet its test objective, or contains illegal use of the language.

### 1.5 Configuration

The candidate compilation system for this validation was tested under the configuration:

Compiler: TeleSoft\_Ada, Version 3.7

Test Suite: Ada Compiler Validation Capability, Version 1.7

Host Computer:

Two Machines:                   Sun 2-120

Operating System:               Sun 2.0

Memory Size:                    3 MB

Disk System:                    Sun 2.0

Target Computer:

Same as host computer

The two SUN computers are connected to a disk system, a VAX/UNIX, and a tape drive via Ethernet. One of the two SUN computers acts as a file server for both SUN computers. The VAX/UNIX system was used for printing of results only.

## CHAPTER 2

### TEST RESULTS

#### 2.1 ACVC Test Classes

Conformance to ANSI/MIL-STD-1815A is measured using the Ada Compiler Validation Capability (ACVC). The ACVC contains both legal and illegal Ada programs structured into six test classes: A, B, C, D, E, and L. Legal programs are compiled and executed while illegal programs are just compiled. Support packages are used to report the results of the legal programs. A compiler must correctly process each of the tests in the suite and demonstrate conformance to the Ada Standard by either meeting the pass criteria given for the test or by showing that the test is inapplicable to the implementation. Tests that are found to contain errors are withdrawn from the ACVC. The results of validation testing are summarized in the following table:

RESULT	TEST CLASS						TOTAL
	A	B	C	D	E	L	
Passed	66	821	1023	17	9	21	1957
Failed	0	0	0	0	0	0	0
Inapplicable	2	3	297	0	2	2	306
Anomalous	0	0	0	0	0	0	0
Withdrawn	0	4	12	0	0	0	16
TOTAL	68	828	1332	17	11	23	2279

A total of 1993 tests were processed during this validation attempt, including 7 passed tests for the report package, 28 not applicable tests and 1 test withdrawn after 86-02-04. The 15 tests in Version 1.7 withdrawn until 86-02-04 were not processed, nor were 278 Class C tests that were inapplicable because they use floating point types having digits that exceed the maximum value for the implementation. All other tests were processed.

Some conventions are followed in the ACVC to ensure that the tests are reasonably portable without modification. For example, the tests make use of only the basic 55 character set, contain lines with a maximum length of 72 characters, use small numeric values, and place features that may not be supported in separate tests. However, some tests contain values that require the test to be customized according to implementation-specific values. The values used for this validation are listed in Appendix B.

### 2.1.1 Class A Tests

Class A tests check that legal Ada programs can be successfully compiled and executed. However, no checks are performed during execution to see if the test objective has been met. For example, a Class A test checks that reserved words of another language (other than those already reserved in the Ada language) are not treated as reserved words by an Ada compiler. A Class A test is passed if no errors are detected at compile time and the program executes to produce a message indicating that it has passed. If a Class A test cannot be compiled and executed because of its size, then the test is split into a set of smaller subtests that can be processed. No splits were required.

The following table shows that all applicable Class A tests passed:

RESULT	CHAPTER												
	2	3	4	5	6	7	8	9	10	11	12	14	TOTAL
-----													
Passed	15	9	0	5	2	12	13	3	0	0	0	7	66
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	0	0	0	0	0	0	0	0	0	0	0	2	2
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	15	9	0	5	2	12	13	3	0	0	0	9	68



### 2.1.2 Class B Tests

Class B tests check that a compiler detects illegal language usage. Class B tests are not executable. Each test in this class is compiled and the resulting compilation listing is examined manually to verify that every syntax or semantic error in the test is detected. A Class B test is passed if every illegal construct that it contains is detected by the compiler. If one or more errors are not detected, then a version of the test is created that contains only the undetected errors. The resulting "split" is compiled and examined. The splitting process continues until all errors are detected by the compiler. Splits were required for 11 tests:

B71001E	BA1101C4	BA3013A6
B71001Q	BA3006A6M	
B71001W	BA3006B3	
B97101E	BA3007B7	
	BA3008A4	
	BA3008B5	

The following table shows that all applicable Class B tests passed:

RESULT	CHAPTER												
	2	3	4	5	6	7	8	9	10	11	12	14	TOTAL
Passed	39	86	86	111	73	67	50	87	36	8	160	18	821
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	0	0	0	2	0	0	1	0	0	0	0	0	3
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	0	1	0	0	0	1	0	1	0	1	0	4
TOTAL	39	86	87	113	73	67	52	87	37	8	161	18	828

### 2.1.3 Class C Tests

Class C tests check that legal Ada programs can be correctly compiled and executed. Each Class C test is self-checking and produces a PASS/FAIL message indicating the result when it is executed. If a Class C test cannot be compiled because it exceeds the compiler's capacity, then the test is split into smaller subtests until all are compiled and executed. No splits were required.

The following table shows that all applicable Class C tests passed:

RESULT	CHAPTER												
	2	3	4	5	6	7	8	9	10	11	12	14	TOTAL
Passed	37	89	162	117	82	18	93	109	39	20	56	201	1023
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	23	120	140	2	0	0	4	0	5	0	0	3	297
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	1	3	0	0	0	0	2	5	0	0	1	12
TOTAL	60	210	305	119	82	18	97	111	49	20	56	205	1332

#### 2.1.4 Class D Tests

Class D tests check the compilation and execution capacities of a compiler. Since there are no requirements placed on a compiler by the Ada Standard for the number of identifiers permitted in a compilation, the number of units in a library, the number of nested loops in a subprogram body, and so on, a compiler may refuse to compile a Class D test. Each Class D test is self-checking and produces a PASS/FAIL message indicating the result when it is executed. If a Class D test fails to compile because the capacity of the compiler is exceeded, then the test is classified as inapplicable.

The following table shows that all applicable Class D tests passed:

RESULT	CHAPTER												
	2	3	4	5	6	7	8	9	10	11	12	14	TOTAL
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Passed	1	0	4	9	3	0	0	0	0	0	0	0	17
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	0	0	0	0	0	0	0	0	0	0	0	0	0
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	0	4	9	3	0	0	0	0	0	0	0	17

Capacities measured by the Class D tests are detailed in section 2.4, IMPLEMENTATION CHARACTERISTICS.

### 2.1.5 Class E Tests

Class E tests provide information about the compiler in those areas in which the Ada Standard permits implementations to differ. Each Class E test is executable and produces messages that indicate how the Ada Standard is interpreted. However, in some cases the Ada Standard permits a compiler to detect a condition either at compile time or at execution time, and thus a Class E test may correctly fail to execute. A Class E test is passed if it fails to compile and appropriate error messages are issued, or if it executes properly and produces a message that it has passed. If a Class E test cannot be compiled and executed because of its size, then the test is split into a set of smaller subtests that can be processed. No splits were required.

The following table shows that all applicable Class E tests passed:

RESULT	CHAPTER												TOTAL
	2	3	4	5	6	7	8	9	10	11	12	14	
Passed	1	3	2	1	1	0	0	0	0	0	0	1	9
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	0	0	0	0	0	0	0	0	2	0	0	0	2
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	3	2	1	1	0	0	0	2	0	0	1	11

Information obtained from the Class E tests is detailed in section 2.4, IMPLEMENTATION CHARACTERISTICS.

### 2.1.6 Class L Tests

Class L tests check that incomplete or illegal Ada programs involving multiple, separately compiled units are detected and not allowed to execute. Class L tests are compiled separately and execution is attempted. A Class L test passes if it is rejected at link time and the test does not execute.

The following table shows that all applicable Class L tests passed:

RESULT	CHAPTER												
	2	3	4	5	6	7	8	9	10	11	12	14	TOTAL
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Passed	0	0	0	0	0	0	0	0	21	0	0	0	21
Failed	0	0	0	0	0	0	0	0	0	0	0	0	0
Inapplicable	0	0	0	0	0	0	0	0	2	0	0	0	2
Anomalous	0	0	0	0	0	0	0	0	0	0	0	0	0
Withdrawn	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	23	0	0	0	23

### 2.1.7 Support Units

Three packages support the self-checking features of Class C tests: REPORT, CHECK FILE, and VAR STRINGS. The REPORT package provides the mechanism by which executable tests report results. It also provides a set of identity functions that are used to defeat some compiler optimization strategies to cause computations to be made by the target computer instead of the by the compiler on the host computer. The CHECK FILE package is used to check the contents of text files written by some of the Class C tests for Chapter 14 of the Ada Standard. The VAR STRINGS package defines types and subprograms for manipulating varying-length character strings. The operation of these three packages is checked by a set of executable tests. These tests produce messages that are examined manually to verify that the packages are operating correctly. If these packages are not operating correctly, then validation is not attempted.

An applicant is permitted to substitute the body of package REPORT with an equivalent one if for some reason the original version provided by the ACVC cannot be executed on the target computer. Package REPORT was modified for this validation in order to print the date and time of execution.

All support package specifications and bodies were compiled and were demonstrated to be operating correctly.

## 2.2 Withdrawn Tests

Some tests are withdrawn from the ACVC because they do not conform to the Ada Standard. When preparing the tape for on site validation 15 tests had been withdrawn. When testing was performed another test had been withdrawn (C940ACA). Therefore, it was run as will but its result was ignored. In total, 16 tests had been withdrawn for the reasons indicated:

- C35904A: The elaboration of subtype declarations SFX3 & SFX4 may raise NUMERIC\_ERROR vs. CONSTRAINT\_ERROR.
- C41404A: The values of 'LAST and 'LENGTH in the "if" statements from line 74 to the end of the test are incorrect.
- C48008A: This test requires that the evaluation of default initial values not occur if an exception is raised by an allocator. However, the LMC has ruled that such a requirement is incorrect (AI-00397).
- B4A010C: The object declaration in line 18 follows a subprogram body of the same declarative part.
- C4A014A: The number declarations in lines 19-22 are not correct, because conversions are not static.
- B83A06B: The Ada Standard 8.3(17) and AI-00330 permit the label LAB\_ENUMERAL of line 80 to be considered a homograph of the enumeration literal in line 25.
- C92005A: At line 40, "/"= for type PACK.BIG\_INT is not visible without a "use" clause for package PACK.
- C940ACA: This test assumes that allocated task TT1 will run prior to the main program, and thus assign SPYNUMB the value checked for by the main program; however, such an execution order is not required by the Ada Standard, so the test is erroneous.
- CA1003B: This test requires all of the legal compilation units of a file containing some illegal units to be compiled and executed. But according to AI-00255 such a file may be rejected as a whole.
- BA2001E: The Ada Standard 10.2(5) states that "simple names of all subunits that have the same ancestor library unit must be distinct identifiers." This test checks for the above condition when stubs are declared; but it is not clear that the check must be made then, as opposed to when the subunit is compiled.
- CA3005A: D (4 tests): There exists no valid elaboration order for these tests.
- BC3204C: The file BC3204C4 should contain the body for BC3204C0 --as indicated in line 25 of BC3204C3M.
- CE2107E: TEMP\_HAS\_NAME must be given an initial value of TRUE.

### 2.3 Inapplicable Tests

Some tests do not apply to all compilers because they make use of features that a compiler is not required by the Ada Standard to support. Others may depend on the result of another test that is either inapplicable or withdrawn. For this validation attempt, 306 tests were inapplicable for the reasons indicated:

The testname indications ending in C-Y, respectively C-Z cover a number of 23, respectively 24 tests.

AE2101C	Instantiation of I/O package with unconstrained array type not allowed
AE2101H	Instantiation of I/O package with unconstrained array type not allowed
B52004E	type SHORT_INTEGER not supported
B55B09D	type SHORT_INTEGER not supported
B86001DT	no valid macro expansion possible
C24113C-Y	Digits 7 - 29
C34001D	type SHORT_INTEGER not supported
C34001F	type SHORT_FLOAT not supported
C34001G	type LONG_FLOAT not supported
C35702A	type SHORT_FLOAT not supported
C35702B	type LONG_FLOAT not supported
C35705C-Y	Digits 7 - 29
C35706C-Y	Digits 7 - 29
C35707C-Y	Digits 7 - 29
C35708C-Y	Digits 7 - 29
C35802C-Y	Digits 7 - 29
C45241C-Y	Digits 7 - 29
C45321C-Y	Digits 7 - 29
C45421C-Y	Digits 7 - 29
C45424C-Y	Digits 7 - 29
C45521C-Z	Digits 7 - 30
C45621C-Z	Digits 7 - 30
C55B07B	type SHORT_INTEGER not supported
C55B16A	No representation clause for noncontiguous enumeration types
C86001F	package TEXT_IO uses package SYSTEM
C87B62A	Representation clause 'SIZE not supported
C87B62B	Representation clause 'STORAGE_SIZE not supported
C87B62C	Representation clause 'SMALL not supported
CA1012A	Separately compiled generic specifications and bodies not allowed
CA2009C	Separately compiled generic specifications and bodies not allowed
CA2009F	Separately compiled generic specifications and bodies not allowed
CA3004E	Inline pragmas ignored
CA3004F	Inline pragmas ignored
CE2201D	Instantiation of I/O package with unconstrained array type not allowed



CE2201E	Instantiation of I/O package with unconstrained array type not allowed
CE2401D	Instantiation of I/O package with unconstrained array type not allowed
EA3004C	Inline pragmas ignored
EA3004D	Inline pragmas ignored
LA3004A	Inline pragmas ignored
LA3004B	Inline pragmas ignored

## 2.4 Implementation Characteristics

One of the purposes of validation is to determine the behavior of a compiler in those areas of the Ada Standard that permit implementations to differ. Class D and E tests specifically check for such implementation differences. However, inapplicable tests in other classes also characterize an implementation. This compiler is characterized by the following interpretations of the Ada Standard:

- Non-graphic characters.

Non-graphic characters are defined in the ASCII character set but are not permitted in Ada programs, even within character strings. The compiler correctly recognizes these characters as illegal in Ada compilations. The characters are contained in the output listing but are not visible if printed except for some of the format effectors which have a visible effect.

- Capacities.

The compiler correctly processes compilations containing loop statements nested to 65 levels, block statements nested to 65 levels, procedures nested to 17 levels, and 723 variables.

- Universal integer calculations.

An implementation is allowed to reject universal integer calculations having values that exceed `SYSTEM.MAX_INT`. This implementation does not reject such calculations and processes them correctly.

- Universal real calculations.

An implementation is allowed to reject universal real calculations having values that exceed certain precisions. This implementation does not reject such calculations and processes them correctly.

- Predefined types.

This implementation supports the predefined type `LONG_INTEGER`. It does not support any other predefined numeric types except those required by the language.

- Based literals.

An implementation is allowed to reject a based literal with value exceeding `SYSTEM.MAX_INT` during compilation or it may raise `NUMERIC_ERROR` during execution. This compiler raises `NUMERIC_ERROR` during execution.

. Array types.

An implementation is allowed to raise `NUMERIC_ERROR` for an array having a `'LENGTH` that exceeds `STANDARD.INTEGER'LAST` and/or `SYSTEM.MAX_INT`. When an array type is declared with an index range exceeding `INTEGER` values and with a component that is a null `BOOLEAN` array, this compiler does not raise any exceptions.

When an array type is declared with an index range exceeding `SYSTEM.MAX_INT` values and with a component that is a null `BOOLEAN` array, this compiler does not raise any exceptions.

A packed `BOOLEAN` array of length `INTEGER_LAST+3` and a packed two-dimensional `BOOLEAN` array with `INTEGER_LAST+3` components may be declared and used without raising exceptions.

Null arrays with one dimension of length exceeding `INTEGER'LAST` may be declared and assigned without raising exceptions.

In assigning one-dimensional array types, the entire expression is evaluated before `CONSTRAINT_ERROR` is raised when checking whether the expression's subtype is compatible with the target's subtype. In assigning two-dimensional array types, the entire expression is not evaluated before `CONSTRAINT_ERROR` is raised when checking whether the expression's subtype is compatible with the target's subtype. In assigning record types with discriminants, the entire expression is evaluated before `CONSTRAINT_ERROR` is raised when checking whether the expression's subtype is compatible with the target's subtype.

. Discriminated types.

An incompletely declared type with discriminants may be used in an access type definition and constrained either there or in later subtype indications.

. Aggregates.

When evaluating the choices of a multi-dimensional aggregate the order in which choices are evaluated and index subtype checks are made depends upon the aggregate itself.

When evaluating an aggregate containing subaggregates, not all choices are evaluated before being checked for identical bounds.

- . Representation clauses.

'SMALL length clauses are not supported.

Enumeration representation clauses are not supported.

- . Generics

When given a separately compiled generic declaration some illegal instantiations and a body, the compiler rejects the body because it is not in the same compilation as its declaration.

- . Package CALENDAR.

TIME\_OF and SPLIT are inverses when SECONDS is a non-model number.

- . Pragmas.

Pragma INLINE is not supported for procedures. It is not supported for functions.

- . Input/output.

Package SEQUENTIAL\_IO cannot be instantiated with unconstrained array types and record types with discriminants. Package DIRECT\_IO cannot be instantiated with unconstrained array types and record types with discriminants without defaults.

More than one internal file can be associated with each external file for sequential I/O for both reading and writing. An external file associated with more than one internal file can be deleted.

More than one internal file can be associated with each external file for direct I/O for both reading and writing. An external file associated with more than one internal file can be deleted.

More than one internal file can be associated with each external file for text I/O for both reading and writing. An external file associated with more than one internal file can be deleted.

An existing text file can be opened in OUT\_FILE mode, can be created in OUT\_FILE mode, and can be created in IN\_FILE mode.

Dynamic creation and resetting of a sequential file is allowed.

Temporary sequential files are given a name. Temporary direct files are given a name. Temporary files given names are not deleted when they are closed. They are however deleted when the Ada program that created them stops execution.

## CHAPTER 3

### Compiler Anomalies and Nonconformances

#### 3.1 Anomalies

An anomaly is a test result that, given the pre-validation analysis, was not expected during formal validation but which is judged allowable by the AVF and the AVO under the circumstances of the validation. No anomalies were detected in this validation attempt.

#### 3.2 Nonconformances

Any discrepancy between expected test results and actual test results is considered to be a nonconformance. No nonconformances were detected in this validation attempt.

## CHAPTER 4

### ADDITIONAL TESTING INFORMATION

#### 4.1 Pre-Validation

Prior to validation, a set of test results for ACVC 1.7 produced by TeleSoft\_Ada, Version 3.7, was submitted to IABG m.b.H., Dept SZT by the applicant for pre-validation review. Analysis of these results demonstrated that the compiler successfully passed all applicable tests.

#### 4.2 Test Site

Tests were compiled and executed at Nynäshamn on two identical computers.

#### 4.3 Test Tape Information

A test tape containing ACVC Version 1.7 was taken on-site by the validation team. This tape contained all tests applicable to this validation as well as all tests inapplicable to this validation. Tests that make use of values that are specific to the implementation were customized. The test suite was read from a tape. Files were structured into directories according to LRM chapters and test categories.

#### 4.4 Testing Logistics

Once all tests had been loaded to disk, processing was begun using a test driver routine provided by the applicant. The test driver, a UNIX shell program, initiates the commands to compile, link, and execute Ada programs dynamically while processing the file directory.

The compiler supports various options that control its operation. The compiler was tested with the following option settings.

## Compiler Option Information

### Basic Information

The compilation process consists of 5 definite passes or steps:

**Front-End:**

Language control, translation to intermediate High-Form.

**Middle Pass:**

Resolution of tasking, translation to intermediate Low Form.

**Code Generator:**

Generation of native code for the target.

**Prelinker:**

Generation of elaboration code for main program.

**Linker:**

The native UNIX linker (ld) is used to link the object modules generated by the compiler.

Below the switches of the different passes are tabulated. The switches pertinent to the UNIX linker are however not treated here.

Front-End Switches		
Name	(default)	Effect
Error_File	(+)	Error file
To_Output	(+)	List to standard output
Dots	(-)	Display one dot per line scanned
Comments	(-)	Pass comments to semantics
Notify	(+)	Ask user for action at error
Verbose	(+)	Verbose output
Long_Integers	(-)	Declare Long Integer when generating package standard.
32bit_Integers	(-)	Define type Integer with 32 bits when generating package standard.
Long_Float	(-)	Declare Long Float when generating package standard.
D_Format	(-)	Define type Long_Float with DEC d_format when generating package standard.
Fe_Max_Pages	1500	Pages in memory
Context	1	Lines of context in errors
Recovery_Level	50	Tokens of context in error recovery
Message_Level	0	Verboseness of error messages

(to be continued)



Front-End Switches (continued)		
Name	(default)	Effect
Abort_Syntax_Count	999	Max # before aborting compiler
Abort_Warning_Count	999	Max # before aborting compiler
Abort_Semantic_Count	999	Max # before aborting compiler
Quit_Syntax_Count	999	Max # before aborting compiler
Quit_Warning_Count	999	Max # before aborting compiler
Quit_Semantic_Count	999	Max # before aborting compiler
Warnings	(+)	Display warning messages
Fe_Debug	""	Debug set
Console_Name	"<stdout>:"	Name of Console
Console_Form	""	Form of Console
Keyboard_Name	"<stdin>:"	Name of Keyboard
Keyboard_Form	""	Form of Keyboard
Error_Name	"errors"	Name of list file
Error_Form	""	Form of list file
Table_Name	"fe_code:ptable"	Name of parse table
Table_Form	""	Form of parse table
Info_Name	"ainfo"	Name of Info file
Info_Form	""	Form of Info file
Message_Name	"fe_code:mfile"	Name of error message file
Message_Form	""	Form of error message file
Liblst_Name	"liblst"	Name of library file
Liblst_Form	""	Form of library file
mpp	(-)	(obsolete)
mpp_trix	(-)	(obsolete)
lock	true	Controls updating of Ada library
Standard	(-)	Generate package Standard.
Source_Name	""	Name of Source file
Source_Form	""	Form of Source file
Help	(-)	Display this text

Middle Pass Switches		
Name	(default)	Effect
check	(-)	Check for MPST Node Already_Exists
debug	(-)	Turn on debugging output
fe_debug	""	Turn on debugging output for FE packages
liblst	"liblst"	Name of sublibrary list file
max_pages	1000	Virtual space pages (like fe_max_pages)
mp_verbose	(+)	Display version, copyright
standard	(-)	Compile standard
varc	""	Various effects, depending on arguments
write	(-)	Write LF even if an error occurred

Code-Generator Switches		
Name	(default)	Effect
d	(-)	Debug switch, generates debug info for debugger.
e	(-)	Generate execution profile information.
i	(+)	Interactive switch, asks action in case of error.
l=<name>	(-)	Creates an assemble list with desired name.
l	(-)	Creates an assemble list with default name ( .s).
lib=<name>	"liblst"	Defines the library list file.
mode=<mode>	"restore"	Determines the mode to open the library.
n=<name>	(-)	Creates labels with name <name>lineno for each line.
n	(-)	Creates labels with default names (S<line no>).
o=<name>	"<cpu name>.o"	Create an object file with name <name>.
p=<digits>	"10240"	Use literal pool of size <digits>.
q	(-)	Do the job quietly.
r=<word>	(-)	Produce relative addresses. Default is absolute.
s	(+)	Give source info (line no) when reporting exceptions.
shadow	(+)	Variable shadowing desired.
slf	(-)	Check the code generator, prints SLF-instructions.
stack	(-)	Suppress checking on stack expansion for overflow.
t=<name>	(-)	Source file; listing with source lines desired.
v=<digits>	"1500"	Virtual memory pages size.
c	(-)	Use CHK instr when applicable.
m=<targeting>	"mc68000"	Choose target machine (MC68k family).

Prelinker Switches		
Name	(default)	Effect
lib=<name>	"liblst"	Names the library file.
l	(+)	Produce link script.
o=<name>	"tsamain.o"	Names the main object file.
q	(-)	Do the job quietly.
r	(+)	Recompile inconsistent units.
v=<digits>	"1500"	Virtual memory pages size.

Options used in compiling ACVC tests:

Front End	
-to_output	No list is generated
-notify	Continue on error
Fe max_pages	1500
others	=default

Middle Pass	
+varc=petz	Controls allocation and alignment
-notify	Continue on error
max_pages	1500
others	=default

Code Gen and Prelinker	
-l	No assembly list generated (code gen)
-l	No link script generated (prelinker)
-i	No interactive execution
-r	No recompilation of inconsistent units (prelinker)
v	1500
others	=default

Test were run on two machines simulataneously starting with the B-Tests. On each machine a batch queue was used. For each test a new program library was created containing the standard Ada package and the ACVC support packages and procedures. The report package was modified in order to print the date and time of test execution. For each chapter the compiler listings and the results, if any, were written to individual files. These files were written on tape in UNIX dd format and archived.

#### 4.5 Testing Duration

The ACVC has not been designed for use in measuring compiler performance. However, information about the length of time needed to test the compiler may characterize compiler performance in processing a large number of programs.

Testing started in the afternoon of 86-04-11 and was completed in the morning of 86-04-20. Testing was interrupted twice for a total of about 20 hours.

## CHAPTER 5

### SUMMARY AND CONCLUSIONS

The IABG m.b.H., Dept SZT, identified 1993 of the 2286 tests in Version 1.7 of the Ada Compiler Validation Capability to be processed during the validation of TeleSoft Ada including 7 tests for the report package. Out of the 1993 tests, one was withdrawn because of test errors (15 tests were withdrawn previously), 28 were ruled inapplicable, and the other 1964 were passed by the compiler.

The IABG m.b.H., Dept SZT concludes that these results demonstrate acceptable conformance to the Ada Standard.

## APPENDIX A

### COMPLIANCE STATEMENT

The only allowed implementation dependencies correspond to implementation-dependent pragmas and attributes, to certain machine-dependent conventions as mentioned in Chapter 13 of MIL-STD-1815A, and to certain allowed restrictions on representation classes. The implementation-dependent characteristics of the TeleSoft\_Ada are described in the following sections which discuss topics one through eight as stated in Appendix F of the Ada Language Reference Manual (ANSI/MIL-STD-1815A).

### 1. Implementation Dependent Pragmas

There is one implementation-defined pragma, COMMENT. It has the form:

```
pragma COMMENT( <string_literal> );
```

It may only appear within a compilation unit and has the effect of embedding the given sequence of characters in the object code of the compilation unit.

### 2. Implementation Dependent Attributes

There are no implementation dependent attributes.

### 3. Specification of Package SYSTEM

```
PACKAGE System IS
```

```
    SUBTYPE Byte is Natural range 0 .. 255;
```

```
    TYPE Address is ACCESS Integer;
```

```
    TYPE Subprogram_Value is PRIVATE;
```

```
    TYPE Name      IS (TeleSoft_Ada);
```

```
    System_Name   : CONSTANT name := TeleSoft_Ada;
```

```
    Storage_Unit  : CONSTANT := 8;
```

```
    Memory_Size   : CONSTANT := (2 ** 24) - 1;
```

```
    -- System-Dependent Named Numbers:
```

```
    Min_Int       : CONSTANT := -(2 ** 31);
```

```
    Max_Int       : CONSTANT := (2 ** 31) - 1;
```

```
    Max_Digits    : CONSTANT := 6;
```

```
    Max_Mantissa   : CONSTANT := 31;
```

```
    Fine_Delta    : CONSTANT := 1.0 / (2 ** (Max_Mantissa - 1));
```

```
    Tick          : CONSTANT := 10.0E-3;
```

```
    -- Other System-Dependent Declarations
```

```
    SUBTYPE Priority IS Integer RANGE 0 .. 63;
```

```
    Max_Object_Size : CONSTANT := Max_Int;
```

```
    Max_Record_Count : CONSTANT := Max_Int;
```

```
    Max_Text_IO_Count : CONSTANT := Max_Int - 1;
```

```
    Max_Text_IO_Field : CONSTANT := 1000;
```

```
PRIVATE
```

```
    TYPE Subprogram_Value is  
        record
```

```
Proc_addr    : Address;  
Static_link  : Address;  
Global_frame : Address;  
end record;  
END System;
```

#### 4. Restrictions on Representation Clauses

The compiler supports the following representation clauses:

Length Clauses: for tasks 'STORAGE\_SIZE (LRM 13.2(C)).  
Address Clauses: for objects and entries (LRM 13.5)

#### 5. Implementation dependent naming conventions

There are no implementation-generated names denoting implementation dependent components.

#### 6. Interpretation of expressions in address clauses

Expressions that appear in address specifications are interpreted as the first storage unit of the object.

#### 7. Restrictions on Unchecked Conversions

Unchecked conversions are allowed between variables of types (or subtypes) T1 and T2 provided that 1) they have the same static size, 2) they are not unconstrained array types, and 3) they are not private (unless they are subtypes of or are derived from type SYSTEM.ADDRESS).

#### 8. I/O Package Characteristics

Instantiations of DIRECT\_IO and SEQUENTIAL\_IO are supported with the following exceptions,

- o unconstrained array types
- o unconstrained types with discriminants without default values.

Calling CREATE with a name of an existing external file does not raise an exception (the old file is overwritten).

In DIRECT\_IO the type COUNT is defined as follows:

type COUNT is range 0 .. 16#7FFFFFFF#;

In TEXT\_IO the type COUNT is defined as follows:

type COUNT is range 0 .. 16#7FFFFFFD#;

In TEXT\_IO the subtype FIELD is defined as follows:

type FIELD is INTEGER range 0 .. 1000;



## 9. Package standard

The package standard used for this compiler corresponds to the specification given in LRM Appendix C. The implementation dependent parts are implemented as follows:

type integer is range -32768..32767;

type long\_integer is range -2147483648..2147483647;

type float is digits 6 range

$$-2 \underbrace{\#0.1\dots1}_{24} \#E128 \dots 2 \underbrace{\#0.1\dots1}_{24} \#128;$$

type duration is delta 2~~#1~~~~#E~~-14 range -86400..86400.0;

## 10. File naming conventions

There are no restrictions on file names other than those imposed by the operating system.

## APPENDIX B

### TEST PARAMETERS

Certain tests in the ACVC make use of implementation-dependent values, such as the maximum length of an input line and invalid file names. A test that makes use of such values is identified by the extension .TST in its file name. Actual values to be substituted are identified by names that begin with a dollar sign. A value is substituted for each of these names before the test is run. The values used for this validation are given below.

\$MAX_IN_LEN	200
\$BIG_ID1	String(1..200) := (1..199 => 'A', 200 => '1')
\$BIG_ID2	String(1..200) := (1..199 => 'A', 200 => '2')
\$BIG_ID3	String(1..200) := (1..100 => 'A', 101 => '3', 102..200 => 'A')
\$BIG_ID4	String(1..200) := (1..100 => 'A', 101 => '4', 102..200 => 'A')
\$NEG_BASED_INT	16#FFFFFFFE#
\$BIG_INT_LIT	String(1..200) := (1..197 => '0', 198..200 => "298")
\$BIG_REAL_LIT	String(1..200) := (1..194 => '0', 195..200 => "69.0E1")
\$EXTENDED_ASCII_CHARS	"abcdefghijklmnopqrstuvwxyz yz!\$%&'()*+,-./:;<=>?@[\]^_`{ }~"
\$NON_ASCII_CHAR_TYPE	(NON_NULL)
\$BLANKS	String(1..180) := (1..180 => ' ')
\$MAX_DIGITS	6
\$NAME	No such numeric type - long integer used
\$INTEGER_FIRST	-2**31;
\$INTEGER_LAST	2**31-1;
\$MAX_INT	2**31-1;
\$LESS_THAN_DURATION	-86 401.0
\$GREATER_THAN_DURATION	86 401.0
\$LESS_THAN_DURATION_BASE_FIRST	-131 072.0
\$GREATER_THAN_DURATION_BASE_LAST	131 072.0
\$COUNT_LAST	2**31-2;
\$FIELD_LAST	1000
\$FILE_NAME_WITH_BAD_CHARS	"X]  /[@#XS*&~Y"
\$FILE_NAME_WITH_WILD_CARD_CHAR	"XYZ*"
\$ILLEGAL_EXTERNAL_FILE_NAME1	"BAD-CHARACTER%/**"
\$ILLEGAL_EXTERNAL_FILE_NAME2	"AAA/AAA"

APPENDIX C  
COMMAND SCRIPTS

Command scripts used for this validation were reviewed by the validation team, but are not released for publication.

END

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